

# Jatropha curcus poisoning in pediatric patients, Mauritius

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## Abstract

**Background:** *Jatropha curcas* (Physic nut; Hindi - Jungle Erandi) is commonly known with the name of pignon d'Inde in Mauritius. It is planted in Mauritius just because of one common myth that it keeps all the bad evils away from the house. Though all parts of the plant are poisonous, but its seeds are claimed to be highly poisonous. Breakthrough of pignon d'Inde poisoning occurred in the year 2003, where total of 11 cases were admitted on the same day with gastrointestinal symptoms in one of the biggest hospital in Mauritius.

**Aim:** In this article, we have tried to discuss the details related to the pignon d'Inde poisoning, clinical manifestations and its management.

**Methods:** Five year data of pignon d'Inde poisoning was collected between 2002 till 2006 admitted in the pediatric unit of Flacq hospital, Mauritius. In the year 2003, where total of 11 cases of pignon d'Inde poisonings were reported, 7 children came on the same day with gastrointestinal manifestations.

**Results:** All the children were treated symptomatically. They were kept under observation for 24 hours and were discharged thereafter.

**Conclusion:** Though most children who ingest *Jatropha curcus* seeds do not suffer much harm; however, health care providers must recognize, assess, and manage the exposures causing serious injuries and initiate the appropriate management to minimize the serious consequences that could endanger the lives of the patients. The main objective of this article is to make the practitioners and general population aware of the potential dangers of pignon d'Inde seeds so as to minimize the accidental pediatric poisoning emergencies and financial burden on the community.

## INTRODUCTION

*Jatropha curcas* (Physic nut; Hindi - Jungle Erandi) is common plant found all over the world. In Mauritius it is well recognized as pignon d'Inde. The other common names are physic nut tree, purging nut tree, Barbados nut tree, Barbados nut, physic nut, poison nut, purging nut. Though the plant grows in wastelands, it is cultivated mainly for hedges.

In Mauritius it is being planted mainly for some prevailing superstitions. Main being the myth, that if it is planted in the backyard of the house, all the evil spirits would stay away. Traditional practitioners commonly use it for many medical

conditions. Despite of its medicinal uses this plant has got poisonous properties as well. Though all parts of the plant are poisonous, seeds have the highest concentration of the toxin and are highly poisonous. The poisonous property of the plant is mainly due to presence of toxalbumin called curcin and cyanic acid, related to ricinoleic acid. Mortality is rare. However in spite of its ubiquity and propensity to cause many adverse effects on accidental consumption; not much literature is available. Every year minimum 2 cases of pignon d'Inde poisoning are reported but breakthrough occurred in the year 2003, where out of 11 total cases of pignon d'Inde poisonings 7 children were admitted on the same day with gastrointestinal symptoms in Flacq hospital,

one of the biggest hospital in Mauritius. In this article of ours, we have tried to enlighten the details related to the pignon d'Inde poisoning, clinical manifestations and its management.

## **MATERIAL AND METHODS**

This original study was done by collecting five years data from 2002 till 2006 of pignon d'Inde poisoning admitted in the pediatric unit of Flacq Hospital, Mauritius. Every year minimum 2 cases of of pignon d'Inde poisonings are reported but in the year 2003, where total of 11 cases of pignon d'Inde poisonings were reported 7 children came on the same day with gastrointestinal symptoms. Since 2002 till 2006, all pignon d'Inde poisonings were accidental and age group ranged between 2-12 yrs (Table-1)

### **Figure 1**

Table 1: Data showing pignon d'Inde poisonings

Year of study	Age group(Years) range	Pignon d'Inde poisoning	Cause of poisoning
2002	10-11	3	Accidental
2003	4-8	11	-do-
2004	2-4	2	-do-
2005	2-12	4	-do-
2006	3-32	4	-do-

In the year 2003, a total of eleven pignon d'Inde poisoning (*Jatropha curcus*) cases were reported to be admitted in the pediatric unit of Flacq hospital in Mauritius. Out of these eleven school children, seven were admitted on the same day i.e 4th January 2003 following consumption of pignon d'Inde seeds (*Jatropha curcus*) with complaints of severe vomiting, loose stools and abdominal pain. The reason for consumption was the attractive shapes of nuts of the plant. Affected children were of the age group 4-8 yrs with male: female ratio being 4:3. Significantly all the cases were from the lower socio-economical group. The number of seeds consumed were 1- 4 (median 2). Vomiting and abdominal pain were the predominant symptoms and present in all the children. Three of the patients had diarrhea as well. The lag time before onset of symptoms varied between 30 minutes to 2 hours. The vital signs in all patients were within normal limits for the age group. Average recovery time was 5-6 hours. All the children were treated symptomatically with intravenous fluids, antispasmodics and antiemetics. Within 24 hours, all of them recovered. They were kept for another 24hr observation and were discharged afterwards.

## **DISCUSSION**

*Jatropha curcas* is common plant found all over the world. *Jatropha curcas* originates from Cental America. From the Caribbean, this plant was probably distributed to various other countries in Africa and Asia by Portugese via the Cape Verde Islands and Guinea Bissau in 15th - 16th century. Today it is cultivated in almost all tropical and subtropical countries as protection hedges around gardens and fields, since it is not browsed by cattle.<sup>(1)</sup>

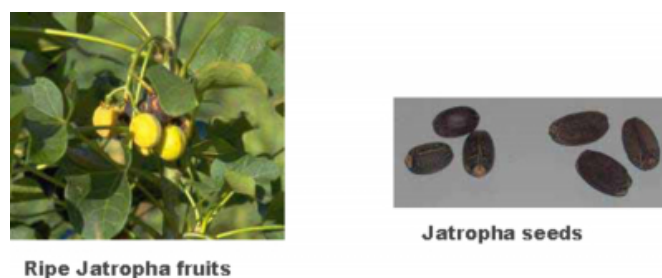
In Mauritius it is commonly known with the name of pignon d'Inde. It is used for many medicinal purposes. In spite of its ubiquity and propensity to cause many adverse effects on accidental consumption; not much information about this plant is available in leading toxicology and forensic medicine books <sup>(2, 3, 4 )</sup>.

*Jatropha curcas* L is a bush or small tree (up to 5 m high) and belongs to the euphorbia family. The genus *Jatropha* contains approximately 170 known species. It grows well with more than 600 mm of rainfall per year, and it withstands long drought periods.

The leaves of *Jatropha curcas* L are lobed, green and smooth. The flowers are small, yellow and are mostly hidden by the leaves. The stem is thick, green, glabrous becoming woody at the base. The fruit is ovoid, oblong and contains 3 lobes with each lobe containing a seed. The fruit looks attractive (Figure – 1) <sup>1</sup> and closely resembles cashew fruit though it bears no relationship to the latter. The genus name *Jatropha* derives from the Greek *jatrós* (doctor), *trophé* (food), which implies medicinal uses.

### **Figure 2**

Figure 1: Showing ripe *Jatropha* fruits and seeds



*Jatropha* is an ornamental plant naturalised in many tropical areas. The roots, stems, leaves seeds and fruits of the plant have been widely used in traditional folk medicine in many parts of Africa <sup>(5)</sup>.

In Homeopathy, it is used for cold sweats, colic, cramps, diarrhoea etc. The yellow oil (also called Hell oil) is extracted from the seeds and is used for many medical

conditions like eczema, herpes, indolent ulcers, chronic rheumatic pain. Mauritians massage ascitic limbs with this oil. Medically it is used for purgation and as a styptic (6). The seeds of *J. curcas* have been used as a purgative, antihelminthic and abortifacient as well as for treating ascites, gout, paralysis and skin diseases. The seed oil of the plant has been used as an ingredient in the treatment of rheumatic conditions, itch and parasitic skin diseases, and in the treatment of fever, jaundice and gonorrhoea, as a diuretic agent, and a mouth-wash. The oil is also used for soap making, candle making and adulteration of olive oil. Nuts ground and mixed with palm oil are used as rat poison. Recently, the toxin (curcin) has been shown to have antitumor property (6). The latex of the plant has been shown to have hemostatic property. The leaf has been used as a haemostatic agent and the bark as a fish poison. In certain African countries people are accustomed to chew these seeds when in need of a laxative. In India, pounded leaves are applied near horses' eyes to repel flies. *J. curcas* seeds have also been found to be highly effective against helminthiasis.

*Jatropha* seed oil is being tried as a biofuel. The Central Salt and Marine Chemicals Research Institute (CSMCRI), a Government-owned industrial research institute in India, is aiming to cultivate *Jatropha* plant for the production of biodiesel (7). *Jatropha* oil is an environmentally safe, Cost-effective, renewable source of non-conventional energy and a Substitute for diesel, kerosene and other fuel oils. The oil can be mixed Up to 50% and used for tractors and oil engines.

Despite of its medicinal uses the poisonous property of the plant is mainly due to presence of toxalbumin called curcin, ricin and cyanic acid, related to ricinoleic acid (8). Ricin has been shown to exhibit many cardiotoxic and hemolytic effects Though all parts of the plant are poisonous, seeds have the highest concentration of ricin and thus highly poisonous (9). The adverse effects following consumption of seeds include vomiting, diarrhoea, abdominal pain, and burning sensation in the throat. Within fifteen minutes of consumption vomiting and diarrhoea set in. Acute abdominal pain is experienced about a half hour after the ingestion of the seeds. Depression and circulatory collapse have also been reported and are said to be common in children. Although the available literature is scarce but all the *Jatropha* poisoning victims reported so far have been in the pediatric age group and all were presented with gastrointestinal manifestations (9, 10, 11, 12). However Koltin et al (13) reported that miosis is also a presenting sign of

*Jatropha* intoxication. The combination of vomiting, diarrhea and miosis resembles the clinical presentation of organophosphate poisoning. This fact warrants the consideration of *Jatropha* ingestion in the differential diagnosis of organophosphate ingestion.

Human deaths by this plant have not been reported so far though animal deaths can occur. A systemic study by Abdu-Aguye et al (10) had clearly demonstrated the toxic effects of seeds when the extract of the dried seeds was administered intraperitoneally into mice. Post-mortem studies in this case showed widespread haemorrhages involving the colon, lungs as well as infarction of the liver. In another study by Adam et al (14) eleven Nubian goats were fed with *Jatropha curcas* seeds and fatal consequences were seen within 2 to 21 days. Their Post-mortem examination revealed haemorrhage in the rumen, reticulum, kidney, spleen and heart, catarrhal or haemorrhagic enteritis, congestion and oedema of the lung and excessive fluid in serous cavities.

The toxic dose is not known. Eating large quantities of any raw part, may cause slow damage to kidneys. Though it is commonly believed that roasting process detoxifies the seeds, but catastrophes have been reported even after eating roasted seeds.

Treatment is essentially symptomatic and supportive. In all cases of ingestion or suspected ingestion, if possible induce emesis within 1-2 hours of ingestion with Ipecac Syrup or perform gastric lavage with activated charcoal and a cathartic to hasten elimination. There is no specific antidote for it. Specific therapy may be indicated for haemorrhagic gastrointestinal damage, skeletal muscle and gastrointestinal spasm, excessive salivary secretions and haemoglobinuria. After substantial exposures to toxalbumin containing plants, minimum observation period of up to 8 hours is advised. Give IV fluids and electrolyte as necessary to restore and maintain fluid and electrolyte balance. Monitor renal function and alkalinize urine to minimize effects of haemoglobinuria. Treat hemorrhagic gastro-intestinal damage as for peptic ulceration. Observe for signs of CNS depression and initiate assisted ventilation if necessary.

## **CONCLUSION**

It is interesting and at the same time surprising also that despite of the extensive medicinal uses of *Jatropha curcus*, it is planted in Mauritius just because of one common myth that it keeps all the bad evils away from the house. Therefore it is necessary to educate the general population regarding the myth and should also be told about beneficial as well as

the adverse effects of this plant. So that they can use the different parts of the plants for various medical conditions and also cultivate it for the production of biodiesel. In general, accidental pediatric poisoning must be recognized as a global public health problem with significant opportunities for prevention. Though most children who ingest *Jatropha curcus* seeds do not suffer much harm; however, health care providers must recognize, assess, and manage those exposures that are most likely to cause serious injuries and initiate appropriate management to minimize the serious consequences that could endanger the lives of the patients. The very purpose of this article is to make the practitioners and general population aware of the potential toxicological dangers that children may come across, and this would certainly reduce accidental pediatric poisoning emergencies and financial burden on the community. Simultaneously the older children should be taught in schools to avoid experimentation with unfamiliar plant substances and household chemicals (15).

### **LIMITATION OF THE STUDY**

However it is important to clarify here that in our study we only included the data of Pignon d'Inde poisoning from one hospital. There are many other big hospitals in Mauritius whose data were not reported. Thus the exact picture of the incidence, prevalence and mortality rate of this poisoning in Mauritius can not be told.

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